



## Feasibility of Detecting Prickly Pear Cactus with Multi-Spectral Short-Wave Infrared Technology for a Cactus Moth Detection Program

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The detection of *Cactoblastis cactorum* in Florida in 1989 was recognized by researchers and the conservation community as a serious threat to the diverse prickly pear species of North America and to the agricultural uses of prickly pear in Mexico. With the moth's dispersal along the Atlantic coast to Bull Island, South Carolina and along the Gulf Coast to Dauphin Island, Alabama by 2004, researchers estimate *C. cactorum* will reach the Texas border by 2007 (Bloem, et.al pers. comm.). In 2004, APHIS PPQ developed a strategic plan with the Agricultural Research Service to increase detection along the Gulf Coast and test a method of mitigating or stopping the spread using the sterile insect technique. ARS and CPHST will conduct the release of sterile insects on two islands during 2005 in a validation study to determine if a barrier to westward expansion can be established.

In order to more clearly delineate the leading edge of the westward expansion of the cactus moth, knowing where prickly pear hosts are is crucial for increasing detection efforts using traps or

visual surveys. This is especially important in the Southeastern US where little is known about *Opuntia* species distributions.



Prickly pear cactus near Boca Chica Beach by the mouth of the Rio Grande, Cameron Co. Texas, 2005

Remote sensing technology may be an ideal tool to provide the data necessary to create a host distribution map without the need for extensive surveys on the ground. Everitt et al. (1991) documented the effectiveness of using a camera sensitive to the shortwave-infrared (SWIR) spectral region to differentiate prickly pear cactus from other plant species in rangeland

locations. Our goal is to build further on this work using a high resolution multi-spectral camera system sensitive in the SWIR region to differentiate prickly pear cactus along the Gulf Coast.

The cactus moth program recently purchased a new higher resolution SWIR camera to use for the detection of prickly pear host plants. We will incorporate this new camera into the current multi-spectral camera system developed by Jim Everitt and the ARS remote sensing group at Weslaco, TX. Once the camera system is functional, ARS will load the system into their aircraft and we will begin conducting tests. Research sites have been determined for 2 locations in Texas. Three additional sites will be determined along the Gulf Coast close to the front of the cactus moth distribution. Research sites will be located within natural beach areas, residential areas, and inland sites to look at potential differences in the detection to prickly pear.



Submitted by David Bartels



## Spatial Technology Survey Tools

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CPHST is working with several USDA and state university personnel to develop integrated survey and detection tools that capture spatial data from the field in digital form. Survey tools are being developed for phorid flies (biological control organisms for imported fire ants), non-



Survey specialist using GPS/PDA handheld unit.

native cactus moth spread and management, and SOD nursery surveys. Currently, CPHST is using ESRI® Arc-pad software as the field data entry platform. As a handheld, MS Windows based package, ArcPad, will allow surveyors and inspectors to replace the classic (error prone) manual clipboard data entry device they now use. Using an automated handheld data entry tool such as ArcPad, if developed correctly, would significantly improve data quality, and reduce the time and level of resources necessary to collect, store and re-distribute field data. This tool should give managers of survey and inspection programs a way to monitor the quality of work performed, allowing managers to accurately set and track benchmarks identified.

Digital data collection systems that use Global Positioning Systems (GPS) and

Personal Digital Assistants (PDA's) increase data quality thru standardized data collection, movement and processing. Development and integration of these technologies has tremendous potential to reduce the time it typically takes to evaluate surveys and inspections, make decisions and trigger appropriate responses to manage program activities. Financial savings are anticipated through reduced data transcription labor costs between field paper and computers and reduction in manpower costs in getting data from field locations. Further, time savings of 25-50% in transcribing records and in physically moving data between field locations and management centers are anticipated.



Submitted by Ronald D. Weeks, Jr.